

submitted for the Examiner's consideration pursuant to 37 C.F.R. §1.132.¹

Claims 29-54 are pending in this case; claims 29 and 41, which are the only independent claims, were previously amended so as to clarify their meaning, by adding a further limitation in the form of an exclusionary proviso. In the Office Action, all of the claims were rejected under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement, in that the portion of the specification upon which applicant relied for support for the new negative limitation was deemed inadequate to provide that support. In addition, the claims were once again rejected under 35 U.S.C. §103(a) as unpatentable over US5932086 (Kasaaian) in view of US3301777 (Leonard). Applicant respectfully submits, however, that based upon the Nicol Declaration, the specification *does* provide the necessary support for the new negative limitation, and the claims *are* patentable over the cited prior art and are otherwise allowable.

As stated above, applicant previously amended the claims so as to highlight a clear distinction from Kasaaian, namely, that the process of the present invention is entirely hydrometallurgical, in that it does not require a sintering or roasting step. Support for this new limitation was said to be found in the description of the prior art on

¹ The credentials of Prof. Nicol are recited in detail in his Declaration (¶¶ 1-3) and in his *curriculum vitae*, which is appended to his Declaration as Annexure MJN-1. Prof. Nicol's extensive qualifications as an expert are therefore evident, and will not be discussed in any further detail in these remarks.

page 2, lines 12-21, of the specification, but in the Office Action the Examiner disagreed, contending that the claims had been amended to contain subject matter “which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention” (Office Action, page 2).

Although the Examiner is correct that the specification must convey possession of the claimed invention to one skilled in the relevant art, it is submitted that the Examiner is not correct in his assessment of the specification of the present application. The test is obviously whether the words used in the specification would convey sufficient information to one of ordinary skill in that art, and according to an expert in the field, the specification in this case *would* convey to the skilled artisan that the relevant prior art *required* a sintering or roasting step, and that the present invention does not.

As Prof. Nicol points out, there are two passages in the specification which, when taken together, would clearly convey this concept to one of ordinary skill. The first such passage is on page 1, lines 18-21, and the second is on page 2, lines 12-16, and both passages are quoted directly by Prof. Nicol (see Nicol Declaration, ¶ 8). Prof. Nicol goes on to assert that these passages “would convey to one of ordinary skill in the art that the previous art to process MnO₂ ores needed to have a roasting step (read

sintering step) and needed to use relatively high grade ores (as confirmed in the Kasaaian patent), unless non Mn(IV) manganese ores, such as Mn_3O_4 ores, are processed” (Nicol Declaration, ¶ 9).

Thus, the clear implication of these passages to a skilled artisan, particularly the passage on page 2 where the use of kilns (or heating then cooling) is negated, would be that a roasting or sintering step is *not* required if (or when) relatively low grade manganese ores are processed, which is the case with the present invention.² Based upon the foregoing, applicant contends that the rejection of the claims under 35 U.S.C. §112, first paragraph, as failing to comply with the written description requirement, should now be withdrawn.

In the Office Action, the Examiner stated that “even if the added [negative] limitations are considered, the Kaasian [sic] patent teaches the use of un-sintered or natural ore” (Office Action, page 3). In particular, the Examiner contends that while Kasaaian's “preferred embodiment uses sintered ore, the patent teaches the use of natural manganese ore as an equivalent to the sintered ore” (Office Action, page 3).

² As set forth on page 1 of applicant's specification, the present invention contemplates use of an ore that is mostly manganese dioxide (wherein the Mn valence is +4), which is considered a “low grade” ore because it contains less than 40% (that is, only about 34%) manganese, whereas the ore that is used in Kasaaian is predominantly Mn_3O_4 (wherein the Mn valence is about +2.66), which is considered a “high grade” ore because it contains more than 40% (actually about 42%) manganese.

Therefore, the Examiner again rejected all of the claims over Kasaaian in view of Leonard. Applicant respectfully traverses this rejection, since applicant believes that the Examiner's reliance on Kasaaian for the equivalence conclusion set forth in the Office Action is misplaced.

The Examiner relies on Kasaaian's alleged disclosure, at column 2, lines 44-46, of "the use of different sources of mananomanganic [sic] oxide, including sintered manganese ore or natural manganese ore" (Office Action, page 3). However, as Prof. Nicol makes clear, this alleged equivalence refers *only* to manganomanganic oxide (Mn_3O_4), which is manifestly a higher-grade ore, as contrasted with the fundamentally different, lower-grade ore, comprised primarily of manganese dioxide (MnO_2), that is the starting material in applicant's claimed process³ (Nicol Declaration, ¶ 19). There is no suggestion in Kasaaian that *every* sintered manganese-containing ore is equivalent to its natural counterpart ore, and there is certainly no disclosure, teaching or suggestion in Kasaaian that un-sintered or natural manganese dioxide ores are equivalent to sintered manganese dioxide ores, which is the incorrect conclusion that the Examiner has drawn from Kasaaian, and is the proposition for which the Examiner now cites Kasaaian.

³ See applicant's independent claims 29 and 41, both of which specify a "manganese dioxide containing feedstock" or starting material.

In the absence of any support in Kasaian for the conclusion about the equivalence of sintered and natural MnO_2 ores drawn by the Examiner, it will be seen that the negative limitations previously introduced into claims 29 and 41 by applicant do provide the necessary distinction that renders these claims patentable over the cited prior art. Applicant's invention provides an efficient manner in which to leach MnO_2 ores directly, without the need for an intervening roasting or sintering pre-treatment step that would first convert (*i.e.*, reduce) any MnO_2 in the starting material to Mn_3O_4 (Nicol Declaration, ¶ 19).⁴

Furthermore, and from a broader perspective, both the Kasaian patent and the Leonard patent relate predominantly to electrolytic manganese metal (or "EMM") technology (from which manganese *metal* is produced), rather than to electrolytic manganese dioxide (or "EMD") technology, to which applicant's invention is directed and which is only mentioned briefly in Kasaian (Nicol Declaration, ¶¶ 11- 15). It is particularly significant, however, that Kasaian does not provide any examples of using his process to produce EMD, and that Kasaian never mentions using his invention in a continuous recirculating hydrometallurgical process in which certain materials (*e.g.*,

⁴ In Kasaian, the sintering step performs a certain amount of reduction (removal of oxygen) of the MnO_2 that is present in the feed, that is, the amount that may be necessary to move from an average valence of Mn^{+4} in the ore to $\text{Mn}^{+2.66}$. In other words, two-thirds of the necessary reduction of Mn is being performed by the sintering step of Kasaian, while only one-third of the reduction is being performed by the SO_2 of Kasaian. This pre-treatment is unnecessary in the presently claimed process, in which all of the necessary reduction of the manganese is achieved in the SO_2 leach.

spent acid or manganese-depleted electrolyte solutions) are recycled back to the beginning of the leach step. Therefore, it may be concluded that Kasaaian did not use return electrolyte solutions at all, or at least not for a sufficient number of cycles to encounter the steady, unacceptable accumulation of manganese dithionate in the leach solution during each successive leach cycle.

Thus, Kasaaian was probably unaware of the negative effects of dithionate by-product formation that would render his process *unusable* for commercial EMD production (Nicol Declaration, ¶¶ 15, 17, 20). Moreover, the absence of any discussion in Kasaaian of by-product dithionate production is also probably due to his belief that his process was applicable to manganomanganic oxide (Mn_3O_4) ores, in which the significantly lower average manganese valence state (as compared with MnO_2 ores) requires far less sulfur dioxide for reduction, resulting in the formation of even less dithionate (Nicol Declaration, ¶ 16, 20).

Kasaaian does not deal (nor does Leonard) with the fundamental purpose and thrust of applicant's invention, which is to prevent or minimize the formation of lower valence oxy-sulfur-containing species such as dithionate, the latter being a major inefficiency that had been known to occur during the reduction of higher oxides of manganese with sulfur dioxide, and which had heretofore discouraged the industry from

utilizing a sulfur dioxide leach in commercial EMD production using lower-grade manganese ores (Nicol Declaration, ¶ 11). Accordingly, one of average skill in the art would not have looked to Kasaaian for suggestions on how to solve this problem, nor would such a worker have looked to Leonard who, rather than *reducing* the amount of dithionate produced as a by-product of his process, actually simply states that purposely *adding* dithionate (a conventional additive for any EMM electrowinning step) *will not affect the operation of his invention* (Nicol Declaration, ¶¶ 13, 18). This is not a teaching by Leonard that during the leaching reaction the production of dithionate as a contaminant can be reduced or minimized.

Thus, even assuming *arguendo* that it would have been obvious to a person of ordinary skill in the art to modify Kasaaian's method so as to include the alleged teachings of Leonard, the resulting "hybrid" postulated by the Examiner would still not yield the invention as presently claimed by applicant in independent claims 29 and 41. For this reason, the rejection of the claims under 35 U.S.C. §103(a) as unpatentable over Kasaaian in view of Leonard should now be withdrawn.

The Commissioner is hereby requested to construe this paper as including a retroactive petition for a two-month extension of time in which to file a response to the outstanding Office Action, and accordingly, the official fee of \$245.00, as prescribed

therefor by 37 C.F.R. §1.17(a)(2), as amended, in the case of a small entity, is submitted herewith. The Commissioner is authorized to charge any additional extension fees which may be required, or to credit any overpayment, to Deposit Account No. 07-1730.

Applicant has responded herein to the points raised by the Examiner in the Office Action, and applicant has previously amended the claims in an earnest effort to place this application in condition for allowance. Accordingly, further favorable action in connection with this patent application is earnestly solicited. The Examiner is invited to contact the undersigned attorney by telephone if it will advance the prosecution of this case.

Respectfully submitted,

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